Exodontiellini, a New Tribe of Opiinae with Exodont Mandibles

(Hymenoptera: Braconidae)

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In the Ichneumonoidea, the term exodont refers to a type of mandible in which the teeth point in an outwardly direction. In addition, such mandibles are usually apically broadened and comparatively massive. Unlike the mandibles of the vast majority of the ichneumonoid species, those of the exodont form cannot be used in normal chewing and biting. Griffiths (1964) has discussed the function of these remarkable structures with respect to the Alysiinae.

Previously described exodont ichneumonoids are now placed in 3 different tribes: the Idiogrammatini of the ichneumonid subfamily Tryphoninae; and the Alysiini and Dacnusini of the braconid subfamily Alysiinae. The 8 species of the Idiogrammatini all belong in the genus *Idiogramma* Foerster (Townes, 1969). The Alysiini and Dacnusini contain over 600 and 500 species respectively; and these are currently placed in about 60 genera (Shenefelt, 1974; Fischer, 1975). *Vanhornia* Crawford, of the Proctotrupoidea, also has exodont mandibles (Crawford, 1909). The exodont condition is thus not unique; and has evolved independently at least three times. A recent examination of material from the Canadian National Collection (CNC), the U. S. National Museum (USNM), and the California Insect Survey has shown that even within the Braconidae, this feature has apparently evolved several times.

In material from South America, specimens representing a new genus near *Aspilodemon* Fischer were found to possess overlapping mandibles on which the spine-like teeth (Fig. 1) were pointed in an outward direction. The specimens otherwise resemble members of the Hormiini; and, unlike the Alysiinae, have well-developed occipital and prepectal carinae. The mandibles, though exodont, are unlike those found in any of the Alysiinae; and are undoubtedly of a different origin.

Several specimens representing an unusual exodont braconid have also been collected from various localities in Western North America. Unlike members of the Alysiinae, these do not have a well-developed median longitudinal sulcus (the posterior-median sulcus) extending from a depression in the ocellar triangle back to the foramen magnum. In addition, the wing venation and facial features are quite different from those of previously described alysiines. Two species, representing a new genus, are described below. Because of their

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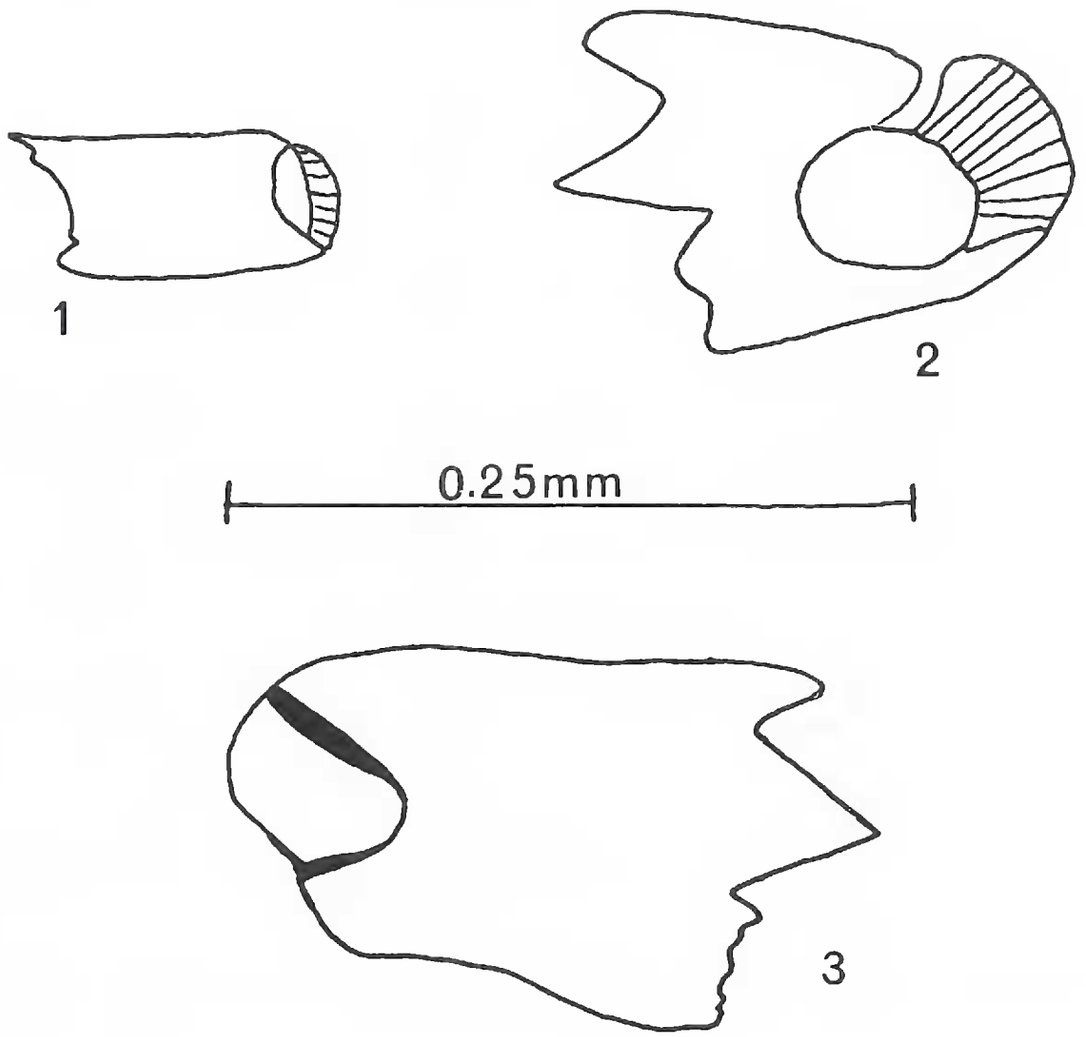


Fig. 1. Left mandible of exodont hormiine. Fig. 2. Left mandible of *Exodontiella muesebecki* n. sp. Fig. 3. Right mandible of *Exodontiella* sp., male.

overall similarity to some of the smaller opiines, I prefer to place them in the Opiinae rather than the Alysiinae. In either case, this new group should be treated as a distinct tribe.

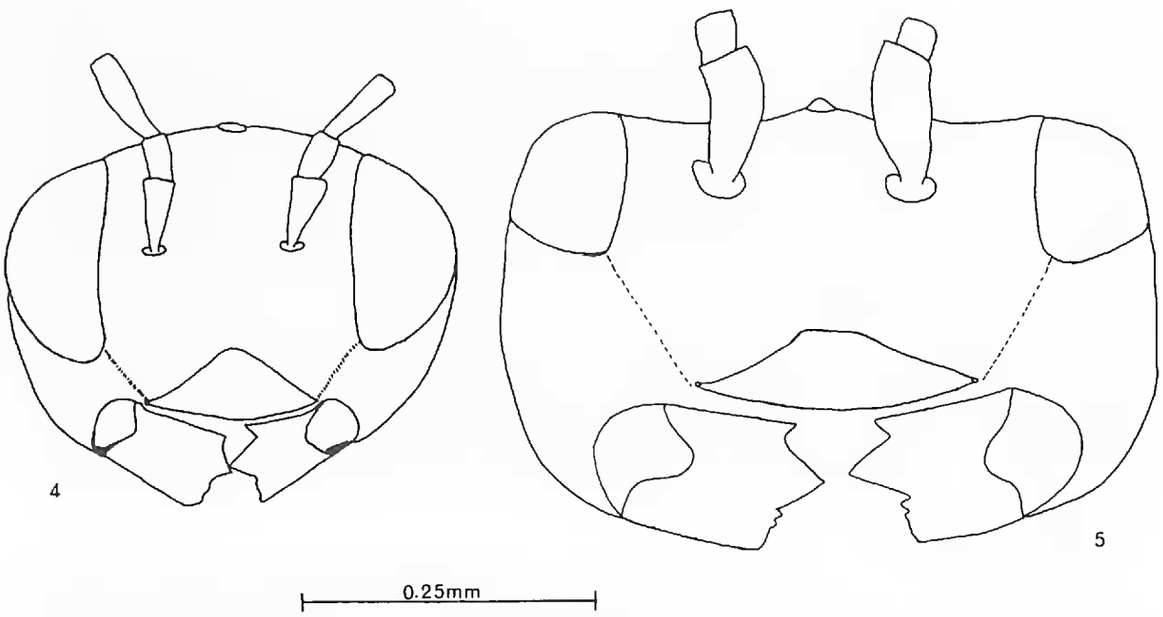
Terminology and measurements used in the descriptions have been defined elsewhere (Wharton, 1977).

Exodontiellini, new tribe.

Mandibles very broad, exodont, with well-defined teeth. Clypeal margin convex, opening between clypeus and mandible absent when mandibles closed; epistomal sulcus narrow, very weakly impressed; paraclypeal pits small, not noticeably impressed. Occipital carina absent; posterior-median sulcus very weak to absent. Prepectal carina absent. Wing venation reduced: fore wing without anal cross-veins; radial cell reduced to nearly absent, radius terminating far from wing tip; postnervellus absent. Abdomen sessile, short, depressed; first tergite heavily sclerotized throughout.

Exodontiella, new genus.

Head transverse; concave posterior-medially; narrowed ventrally. Eyes small, malar space large. Mandibles with 3 well-defined teeth; median teeth touching or slightly overlapping when mandible closed. Clypeus with outer surface weakly convex; epistomal sulcus narrow but distinct. Subocular suture present. Maxillary and labial palps reduced; apparently 4-5 and 2-3 segmented respectively. Antennae shorter than body; with few



Figs. 4-5. Frontal view, head of *Exodontiella* spp. Fig. 4. *E. deserticola* n. sp.; Fig. 5. *E.* sp., male.

(less than 20) segments. Thorax broad, deep. Notauli weakly impressed; sternauli absent. Prescutellar pit narrow, deep. Metanotum with posterior-median plate nearly reaching anterior border. Propodeal carinae completely absent. Posterior (or inner) spur of hind tibia slightly longer than anterior spur; femora short, relatively broad. Fore wing with 3 cubital cells; the second small, triangular. Radial cell extremely narrow, nearly absent; radius strongly upcurved and terminating immediately behind enlarged stigma. Cubital segment forming lower border of second cubital cell distinctly thickened distally. Brachial cell opened distally; third discoideal segment and distal portion of brachius absent. Nervulus postfurcal. Recurrent vein antefurcal. Submediellan cell closed distally by well-developed nervellus. Cubitella stronger than radiella; both nearly absent. Three hamuli. Abdomen moderately depressed. Petiole short, very broad. Suture between tergites 2 and 3 distinctly impressed; tergite 2 and at least part of tergite 3 sculptured.

Type: *Exodontiella deserticola* new species.

Exodontiella deserticola, new species.
(Fig. 4, 6, 7)

Head: 1.67 times broader than long; 1.33 times broader than mesonotum. Head in dorsal view wider at eyes than at temples. Eyes small, converging ventrally; roughly twice length of temples dorsally, about half length of temples ventrally. Eyes bare; occiput densely hairy medially, more sparsely so laterally and on temples. Malar space large; about one-third eye height. Ocellar triangle large; distance between posterior ocelli nearly as great as ocellar-ocular line. Face moderately convex; matt; roughly twice wider than high. Clypeus nearly ellipsoidal; approximately 3 times broader than high. Mandibles hairy, about 1.20 times longer than apical width; upper and lower borders slightly diverging; tooth 2 broadly triangular, moderately protruding; teeth slightly overlapping when mandible closed; tooth 1 and 3 broad, separated from tooth 2 by indented borders; tooth 1 extending distad of tooth 3; tooth 3 distinctly larger than tooth 1, and with slightly sinuous outer margin. Antennae 12 segmented, roughly 1.50 times longer than thorax; first flagellomere 1.27 times longer than second; flagellomeres distinctly broader apically; all flagellomeres bearing long subapical hairs. Maxillary palps shorter than head.

Thorax: 1.56 times longer than broad; 1.24 times longer than high. Notauli parallel,

narrow, weakly impressed; covering about anterior two-thirds of mesonotum. Mesonotal midpit absent. Mesonotum sparsely hairy anteriorly. Prescutellar pit nearly smooth; roughly 5.40 times broader than long. Propodeum and metapleuron densely covered with short, white hairs; hairs on posterior half of propodeum dorsally-directed, others ventrally-directed; propodeum granular. Stigma of fore wing short, very broad, roughly twice longer than wide. Recurrent vein distinctly shorter than first discoideal segment. Second cubital cell petiolate, distinct second radial segment absent. First cubital cross-vein (cuqul) about 1.30 times longer than second (cuqu2); the latter quite weak in specimen from Palm Springs. Second mediellan segment about 0.65 times length of first; about 1.80 times longer than basella.

Abdomen: petiole 0.73 times as long as apical width, apex distinctly more than twice wider than base; surface matt and densely hairy except at extreme apex. Tergite 2 and basal half to two-thirds of tergite 3 irregularly longitudinally aciculate. Ovipositor roughly two-thirds length of thorax; not, or only slightly extending beyond tip of abdomen.

Color: dark reddith-brown; petiole and tergites 2+3 of holotype orange. Specimen from Palm Springs lighter reddish-brown.

Length: 1.5 mm.

Holotype female: USA, California, San Bernardino Co., Helendale, 16/V/1955, W. R. M. Mason, Collector. Deposited in CNC. Additional material: Cal., Riverside Co., 6.7 km. S. Palm Springs, 11/VII/1954 (1♀). Deposited in USNM. Males unknown.

Diagnosis: differs from the following species in its lighter coloration, less granular abdominal sculpture, shorter first cubital cross-vein, shorter second flagellomere, and longer mandible with shorter, broader tooth 2.

Discussion: The female from Palm Springs appears to belong here despite its slightly lighter coloration. In addition, the first mediellan segment is distinctly shorter than the second. Additional material is needed to determine whether or not differences in the relative lengths of the mediellan segments are significant in this group.

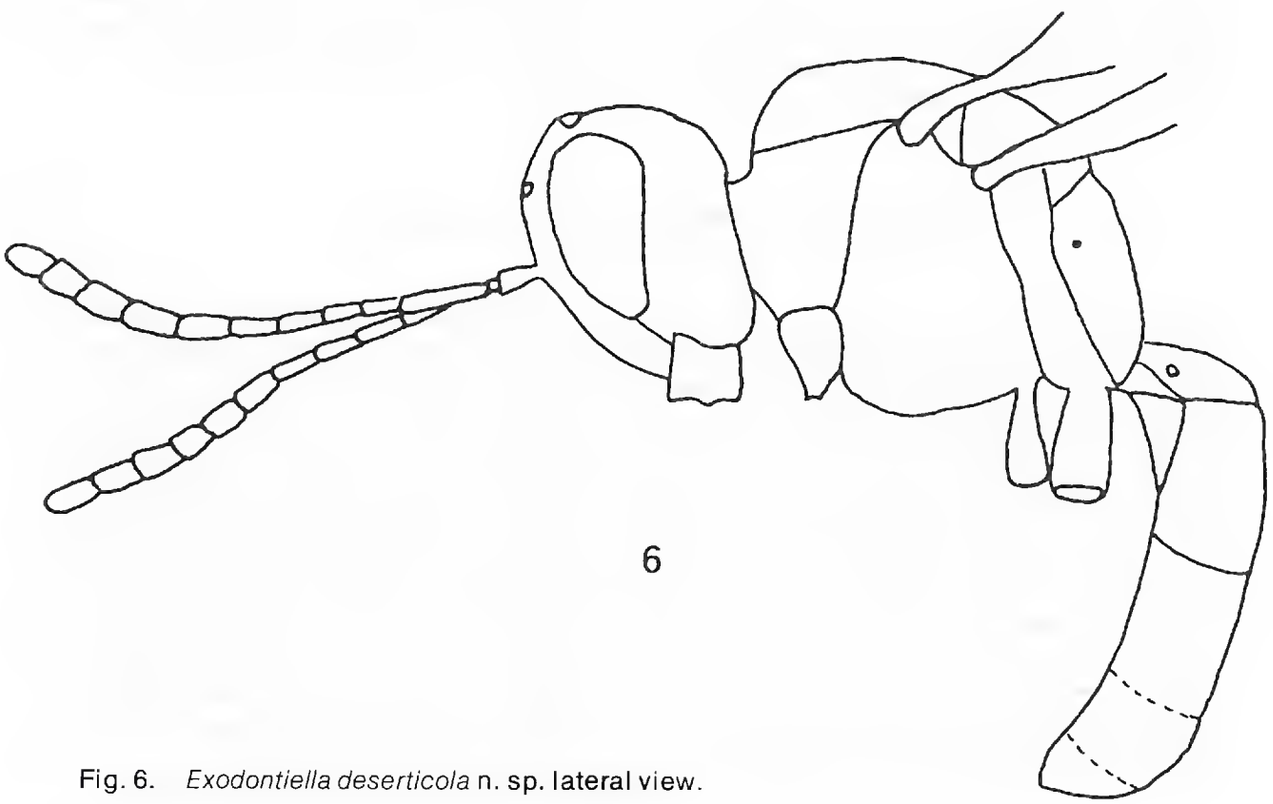


Fig. 6. *Exodontiella deserticola* n. sp. lateral view.

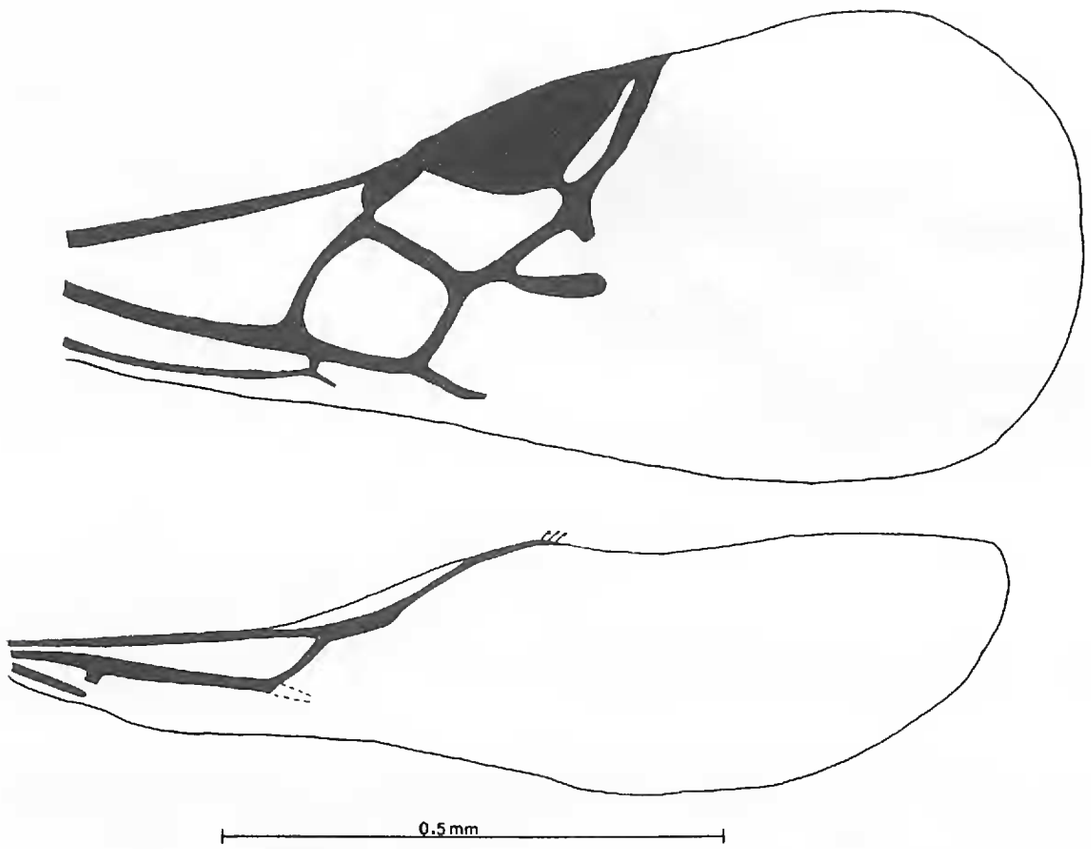


Fig. 7. Fore and hind wing of *Exodontiella deserticola* n. sp. from Palm Springs.

Exodontiella muesebecki, new species.
(Fig. 2)

Head: 1.61 times broader than long; 1.36 times broader than mesonotum. Head in dorsal view as broad at temples as at eyes. Eyes bare; temple and occipital pubescence as in *deserticola*. Malar space about one-third eye height. Ocellar triangle moderately large; distance between posterior ocelli about 0.57 times length of ocellar-ocular line. Face moderately convex, with weak, median ridge; matt; roughly twice wider than high. Clypeus more nearly hemispherical; about 2.50 times broader than high. Mandibles hairy, distinctly shorter than apical width; upper and lower borders slightly diverging; tooth 2 narrowly triangular, slightly protruding, the teeth barely touching when mandible closed; tooth 1 angular, separated from tooth 2 by distinct cleft, tooth 1 protruding distinctly distad of tooth 3, the latter very broad, with distinctly sinuate outer margin. Antennae 13 segmented, roughly 1.85 times longer than thorax; first flagellomere equal in length to second; shape and pubescence as in *deserticola*. Maxillary palps shorter than head.

Thorax: 1.67 times longer than broad; 1.25 times longer than high. Notauli weakly impressed; covering anterior two-thirds of mesonotum; gradually weakening and slightly converging posteriorly. Mesonotal midpit absent. Mesonotum sparsely hairy anteriorly. Prescutellar pit sculptured; roughly 6.50 times wider than long. Propodeum as in *deserticola;* metapleuron slightly less densely hairy. Stigma of fore wing short, very broad, a little more than twice longer than wide. Recurrent vein much shorter than first discoideal segment. Second cubital cell petiolate as in *deserticola,* but with cuqul 1.79 times longer than cuqu2. Second mediellan segment about 1.40 times longer than first, about 2.85 times longer than basella.

Abdomen: petiole roughly 0.75 times as long as apical width; about twice as wide at

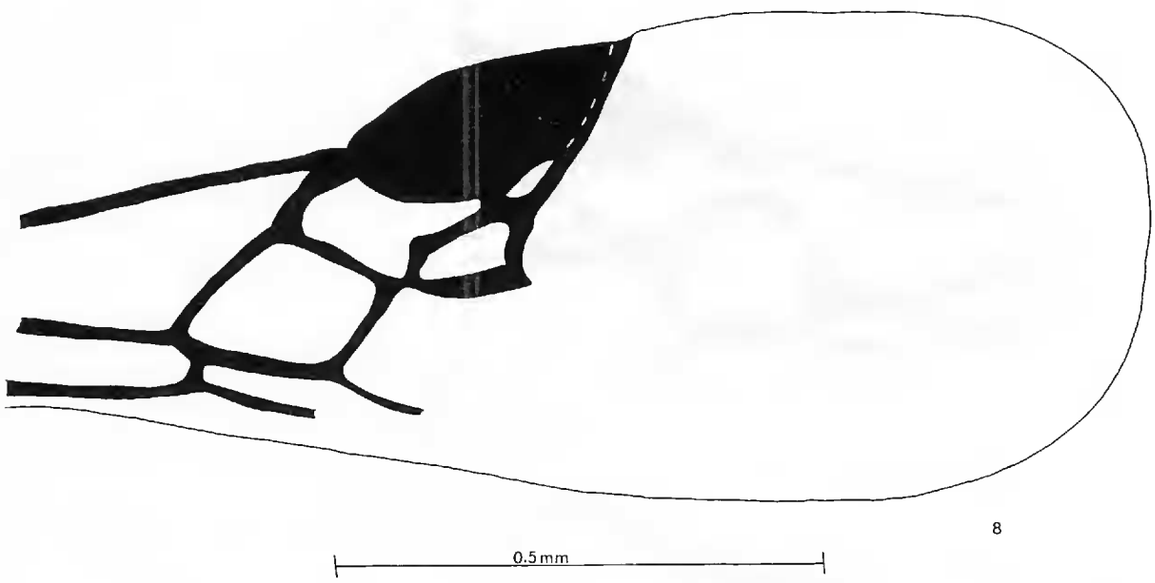


Fig. 8. Fore wing of *Exodontiella* sp., male.

apex as at base; sculpture strongly granular, pubescence as in *deserticola*. Tergite 2 with fine reticulate sculpture, basal three-fourths of tergite 3 granular. Ovipositor as in *deserticola*.

Color: black; abdominal sternites, tegulae, and coxae dark brown; scape, pedicel, first flagellomere and basal half of second yellow; femora brown, with yellowish apices; anterior femora noticeably lighter; mandibles, tibiae, and basal 2-3 tarsomeres yellow-brown.

Length: 1.75 mm.

Holotype female: Canada, Alberta, Cypress Hills Provincial Park, Elkwater Lake, 14/VIII/1973, L. Masner, Collector. Deposited in CNC. Males unknown.

This species is named in honor of Mr. C. F. W. Muesebeck in recognition of his pioneering work on the Nearctic Braconidae.

Diagnosis: distinguished by the shape of the mandible and the length and color of the basal flagellomeres.

In addition to the above, a single male from northwestern Nevada has also been examined. It is strikingly different in the shape of the head — having a broader face and much smaller eyes (Fig. 5). A second radial segment is also present (Fig. 8); and the outer margin of the third mandibular tooth is denticulate (Fig. 3). Some or all of these may be sexual characteristics, however, and the lack of additional material precludes description at this time.

General discussion: The shape of the head (reduced eyes, face narrowed ventrally), the small paraclypeal pits, the narrow, weakly impressed epistomal sulcus, the lack of a well-developed posterior-median sulcus, the reduced facial pubescence, the short, very broad mandible, and the agathidine-like fore wing venation all serve to distinguish *Exodontiella* from any of the previously described members of the Alysiinae. The unusual shape of the mandibles, and the fact that they touch or overlap when closed, indicate a probable independent origin of these structures from the alysiine evolutionary

line. The discovery of *Exodontiella* and the other exodont braconids mentioned above will necessitate a more critical definition not only of the Alysiinae, but also of the Opiinae and probably other braconid subfamilies as well.

The presence of exodont mandibles in both *Exodontiella* and the various members of the Alysiinae is apparently a result of parallel evolution. In the Alysiinae, the primary function of these mandibles is in escape from their hosts' puparium. It will be interesting to learn if the mandibles in *Exodontiella* serve a similar function, or whether they are perhaps used somehow in host finding.

Acknowledgements

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SCIENTIFIC NOTE

Notes on the Host Plants and Distribution of *Acanthoscelides pauperculus* (LeConte) (Coleoptera: Bruchidae).—The two bruchids that are usually taken most often by sweeping in the Sierra Nevada and westward in California and are most abundant in collections from the Pacific States are *Acanthoscelides aureolus* (Horn) and *A. pauperculus* (LeConte). The ubiquitous *A. aureolus* has a variety of hosts, but the hosts of *A. pauperculus* have remained unknown although a concerted effort was made to find them (Johnson, 1970, Univ. Calif. Publ. Entomol., 59:1-116). I recently reared *A. pauperculus* from seeds of a native clover, *Trifolium obtusiflorum* Hooker, collected at 1100', 24 mi NE Sanger, Fresno County, CA, on 26 June 1975. This is the first record of a bruchid feeding in the seeds of a